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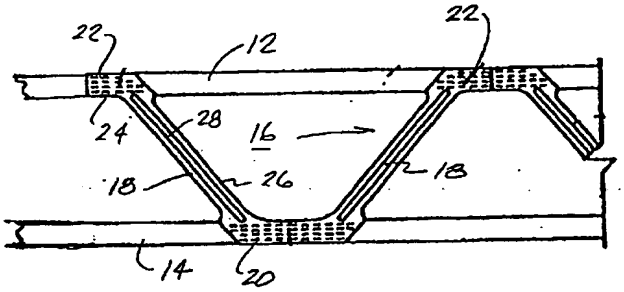
(54) **SOLIVE ARMEE**

(54) **TRUSS-TYPE FLOOR JOIST**



(57) Solive armée comprenant une paire d'éléments allongés de membrure en bois, espacés et parallèles, qui sont reliés l'un à l'autre par une âme triangulée et des connecteurs associés pour assujettir l'âme aux éléments de membrure. Les parties terminales des éléments de membrure en bois s'étendent vers l'extérieur au-delà de ladite âme au moins à l'un des bouts opposés de la solive. Une pièce façonnée rapportée pour poutre de charpente en bois est placée entre les parties terminales s'étendant vers l'extérieur des éléments de membrure en bois et y est rattachée de manière qu'on puisse couper aux dimensions voulues et façonner sur place ce bout de la solive.

(57) A truss-type joist comprises a pair of elongated, parallel spaced apart wood chord members which are interconnected together by a web and have fasteners associated therewith to secure the web to the chord members. End portions of the wood chord members extend outwardly beyond said web at at least one of the opposing ends of the joist. A fabricated wooden structural beam insert is located between and interconnected to the outwardly extending end portions of the wood chord members whereby to enable that end of the joist to be cut and shaped at a job site to desired dimensions.

ABSTRACT OF THE DISCLOSURE

A truss-type joist comprises a pair of elongated, parallel spaced apart wood chord members which are interconnected together by a web and have fasteners associated therewith to secure the web to the chord members. End portions of the wood chord members extend outwardly beyond said web at at least one of the opposing ends of the joist. A fabricated wooden structural beam insert is located between and interconnected to the outwardly extending end portions of the wood chord members whereby to enable that end of the joist to be cut and shaped at a job site to desired dimensions.

TRUSS-TYPE FLOOR JOIST

BACKGROUND OF THE INVENTION

This invention relates generally to improvements in truss-type joists used in building construction.

The prior art has provided a variety of metal webbed wood trusses typically used as floor joists and comprising top and bottom wood chords with metal webs interconnecting these chords. A floor truss or joist of this nature is described in Canadian Patent 1,035,534 issued August 1, 1978 naming James Knowles as inventor and in the U.S. counterpart No. 4,078,352 issued March 14, 1978 (RE 31807). Wood-webbed trusses are also well known wherein the various components are secured together by the well-known toothed connector plate. Traditionally these two kinds of trusses are custom manufactured in various lengths, depending upon the job requirements. Typically, little or no provision was made for on-site adjustments.

Wood-I beam joists manufactured with wood chords and oriented strand board or plywood webs are well known and one example is described in Canadian Patent 1,042,621 issued November 21, 1978 and in the U.S. counterpart No. 3,991,535 issued November 16, 1976. These types of wood-I beam joists are fabricated in certified plants under controlled conditions so that the structural characteristics can be carefully established to ensure that specifications are met. These I-beam joists are typically fabricated in long lengths and utilize a unique tongue and groove joint detail to provide a secure connection between the chords and the web.

SUMMARY OF THE INVENTION

It is a basic object of the present invention to combine the above two basic types of structures to provide a composite truss-type metal or wood-webbed floor joist with a variable or adjustable end arrangement based on the wood-I beam joists briefly described above.

Accordingly, the invention in one aspect provides a composite truss-type joist comprising a pair of elongated, parallel spaced apart wood chord members which are interconnected together by metal or wood webs and having fasteners associated therewith to secure said web to said wood chord members, end portions of said wood chord members extending outwardly beyond said webs at at least one of the opposing ends of said joist, and a fabricated wood structural beam insert located between and interconnected to said outwardly extending end portions of said wood chord members at said at least one of the opposing ends of the joist whereby to enable said at least one end of the joist to be cut and shaped at a job site to a desired dimension.

In a preferred embodiment, the above described beam insert is a wood-I beam section made so that it can be inserted between the top and bottom outwardly extending end portions of the chord members of the webbed joist, with suitable connectors such as truss plates being suitably placed and then pressed in to firmly connect the outwardly extending top and bottom chords of the joist with the top and bottom chords of the wood-I beam insert. The resulting composite joist structure has the ability to resist high shear forces on the ends of the joist due to the style of the I-beam. Since the engineered I-beam insert is fully certified from the outset, i.e. the certification has already been built into the wood-I beam, truss or joist fabricators can build trusses incorporating the adjustable ends on existing equipment without getting special certification from regulatory officials.

Further features and advantages of the invention will be more readily apparent from the following description of preferred embodiments with reference being had to the accompanying drawings.

BRIEF DESCRIPTION OF THE VIEWS OF DRAWINGS

Fig. 1 is a side elevation view of a portion of a metal web truss-type joist with extended top and bottom chords;

Fig. 1A is an end elevation view thereof;

Fig. 2 is a side elevation view of a fabricated wood I-beam insert;

Figs. 2A and 2B are end elevation views of one embodiment of I-beam insert;

Fig. 3 is a side elevation of an end portion of the variable end truss-type floor joist according to one embodiment of the invention;

Fig. 3A is an end elevation view thereof;

Fig. 4 is a side elevation view of the variable truss-type floor joist according to one form of the invention;

Fig. 5 is a perspective view of an end portion of the variable end truss-type floor joist according to one embodiment; and

Fig. 6 is a perspective view of a portion of a variable end wood-webbed truss-type joist according to another embodiment of the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

In the description which follows, like parts are marked throughout the specification and drawings with the same respective reference numbers. The drawings are not necessarily to scale and in some instances proportions may have been exaggerated in order to more clearly depict certain features of the invention.

A metal webbed wood floor truss-type joist 10 (see Fig. 1) is typically used to support a floor in a building. The joist is typically composed of spaced parallel top and bottom wooden chords 12, 14 with metal webs 16 interconnecting both chords. These top and bottom chords 12, 14 are preferably 2 x 4 or 2 x 3 inch lumber with the respective major surfaces facing upwards and downwardly as best seen in Fig.1. The chords 12, 14 are interconnected by the diagonally arranged struts or webs 16 formed of sheet metal. Such metal webs 16 are made in a chevron or V-shape to provide web legs 18, an apex connector plate portion 20 and enlarged leg connector portions 22. The connector portions 20, 22 are provided with a multiplicity of struck-out spikes 24 or teeth for embedding into the chord members 12, 14.

The edges of the web leg 18 are bent to form a continuous inner flange 26 which extends substantially the full length of each leg 18 and continues around the arc forming the apex between the legs and an outer flange. A channel or groove 28 is formed along the length of each leg by bending or impressing for rigidifying the legs in conjunction with the flanges.

The metal web connectors 16 are applied in pairs, one on each vertical face of the aligned chords and their teeth are embedded only into the laterally facing minor side faces of the chords 12, 14. This permits forming the joist by laying the web-connector down upon a horizontal surface with its teeth upwardly, laying the chords 12, 14 above it and then placing the second or opposing web-connector upon the exposed upper minor surfaces of the chords, teeth down, so that a single compression or clamping operation at each overlapped connector portion can cause the teeth thereof to penetrate the wood from opposite sides. For further details of construction reference may be had to Canadian Patent 1,035,534 issued August 1, 1978 naming James Knowles as inventor.

Referring also to Figs. 3-5, the top and bottom wood chord members 12, 14 of the joist have end portions which extend outwardly beyond the metal webs 16 at the opposing end portions of the joist. A fabricated wooden structural I-beam insert 30 is located between and is interconnected to and co-extensive with the outwardly extending portions of the wood chord members 12, 14 at each of the opposing end portions of the composite joist whereby to enable the ends of the composite joist 10 to be cut and shaped at a job site to desired dimensions as noted previously. It should be realized however that the adjustable end structure need only be provided at one end of the joist in many cases.

The fabricated wooden structural beam insert 30 referred to above can assume different forms but it is preferred that these I beam-like inserts be constructed substantially as described in Canadian Patent 1,042,621 issued

November 21, 1978 naming James R. Keller et al as inventor.

The wooden structural I-beam insert 30 described in Canadian Patent 1,042,621 (see Figs. 2A and 2B) essentially comprises a pair of elongated chord members 40, 42 of wood material and a plywood web member 44 interconnecting the chord members by means of glued tongue and groove joints. The plywood or oriented strand board web member 44 has at least two layers of veneer 46 in which the grain of the wood runs approximately perpendicular to the length of the chord members 40, 42 and has at least one intervening layer of veneer 48 in which the grain of the wood runs approximately parallel with the length of the chord members. These two layers 46 of veneer project beyond the intervening layer 48 on two opposite edges of the web member 44 to form a pair of parallel spaced apart bendable tongues 50 on each of said opposite edges. A pair of longitudinal grooves 52 in each of the chord members 40, 42 are spaced apart so as to receive the tongues 50. These grooves 52 in each chord member are inclined from top to bottom relative to each other to bend the tongues 50 out of parallelism with each other and to form a self-locking dove-tail joint when the chord members are pressed onto the web member. These joints hold the members 40, 42 together in assembled relation without external clamps while the glue is setting. Further details of construction and the manner in which assembly is achieved may of course be had from a more detailed review of the above-noted Canadian Patent 1,042,621.

Regardless of the precise type of I-beam insert 30, 30' used, the top and bottom chords are preferably 2 x 4s or 2 x 3s with the respective major surfaces facing upwards and downwardly as best seen in Figs. 3-5. A typical insert 30, 30' can be up to about 18 inches long (or even longer if desired) and these inserts are trimmed from stock lengths which are prefabricated in a certified manufacturing plant.

The assembly of the composite joist is as follows. Each insert 30, 30' is

cut and trimmed from a stock length of wood-I beam. They are inserted between the extended end portions of the top and bottom wood chords 12, 14 of the truss at each end, a typical length of which can be 18". Toothed connector plates 80 are embedded into the laterally facing minor surfaces of the end portions of the top and bottom chords 12, 14 and into the laterally facing minor surfaces of the top and bottom chords of the wood-I beam inserts 30, 30'. These plates firmly interconnect these components. A typical truss plate may be a 6 x 3 inch connector plate. The connector plates 80 are placed at both sides of the proximal ends of the inserts 30, 30 ' to connect the top and bottom chords of the inserts to the respective top and bottom chords of the joist. The sizes and gauge of plates 80 can best be determined by the strength required by the specific size and span of the joist. Intermediate vertical posts 32, 34 are placed between the chords 12, 14 in the middle of the span. The distance between the two wood-I beam inserts 30, 30' defines the primary section of the joist whereas the intermediate vertical posts 32, 34 define the size of the chase opening in the middle. In greater detail, the two vertical posts 32, 34 extend between the top and bottom chords 12, 14 (see Fig. 4), and are connected thereto by metal connector plates 36, 38. Vertical posts 32, 34 (which are preferably 2 x 4 or 2 x 3 inch size,) thus extend between the downwardly facing major surface of top chord 12 and upwardly facing major surface of bottom chord 14. The teeth of the connector plates 36, 38 are embedded into the laterally facing minor surfaces of top and bottom chords 12, 14 and into the laterally facing minor surfaces of posts 32, 34 to firmly interconnect the posts with the chords. Each plate 36, 38 is preferably a 1.5 x 3 inch size.

Each composite joist end section can thus be trimmed at the job site as required. For example, if the overall length of the composite joist , including end sections, is 20 feet, the joist can be configured for any length between 18 and 20 feet simply by trimming one or both end sections.

Fig. 6 illustrates that the invention is not limited to use with metal-

webbed truss-type joists. Here, joist 10' comprises spaced parallel top and bottom wood chords 12', 14' as previoiusly described, which chords are interconnected by the wooden struts 16' arranged in a repeating combination of vertical and diagonal shaped pattern with intermediate posts 17 extending transversely between wood chords 12', 14', with spaced apart toothed connector plates 19, 21, 23 serving to interconnect the struts and posts to the wood chords in a manner well known as such in the art. The end portions of wood chords 12', 14' extend outwardly beyond the wooden web members 16', 17 and between them and co-extensive therewith is situated the fabricated wood structural I-beam 30" exactly as described above. Insert 30' is secured in place by toothed connector plates 80' as described above which are embedded into the laterally facing minor surfaces of the top and bottom chords 12', 14' as well as the top and bottom chords of the wood I-beam insert 30".

The great advantage of the invention is that it allows for ease of adjustability on the job site, i.e. the composite joist can be custom fitted to suit the length requirements on the site. In addition it will allow all truss/joist fabricators to build adjustable end detail with existing equipment. Furthermore, the invention allows for the fabrication of standard stock lengths for inventory purposes. The inventory can be stocked in a warehouse or yard for future sales. This can be produced during a slow construction season to build up inventory for sale in a busy building period. Furthermore, the engineered wood I-beam insert is fully certified from the outset, i.e. the certification has already been built into the wood-I beam and hence truss/joist fabricators can build adjustable ends on existing equipment without getting special certification from regulatory officials.

Although the term "floor joist" or "joist" has been used throughout this specification, those skilled in this art will appreciate that the present invention may find application in other areas where structural load-carrying beams are required. Additionally, the term "wood" as used herein is not limited to natural

woods but encompasses man-made materials such as strand board and similar materials having strand or fibre reinforcement therein.

Preferred embodiments of the invention have been described and illustrated by way of example. Those skilled in the art will realize that various modifications and changes may be made while still remaining within the spirit and scope of the invention. Hence the invention is not to be limited to the embodiments as described but, rather, the invention encompasses the full range of equivalencies as defined by the appended claims.

CLAIMS:

1. A truss-type joist comprising a pair of elongated, parallel spaced apart wood chord members which are interconnected together by a web and having fasteners associated therewith to secure said web to said chord members, end portions of said wood chord members extending outwardly beyond said web at at least one of the opposing ends of said joist, and a fabricated wooden structural beam insert located between and interconnected to said outwardly extending end portions of said wood chord members at said at least one of the opposing ends of the joist whereby to enable said at least one end of the joist to be cut and shaped at a job site to desired dimensions.

2. The joist of claim 1 wherein said wooden structural beam insert is of an I-beam configuration having top and bottom parallel chords interconnected by a further web, each chord of the insert being juxtaposed to a respective one of said outwardly extending end portions of said wood chord members.

3. The joist of claim 2 wherein said chords and further web of said insert are provided with interengaging tongue and groove joints fixed together with adhesive to provide a predetermined structural strength.

4. The joist of claim 3 further including toothed metal connector plates to secure the top and bottom chords of the insert to the outwardly extending end portions of said wood chord members.

5. The joist of claim 1 wherein said web comprises opposed pairs of metal webs formed in a Chevron or V-shape configuration and secured by the fasteners to opposing sides of said chord members.

6. The joist of claim 1 wherein said web comprises wooden web members certain of which are disposed in a repeating combination of vertical and diagonal shaped patterns and secured by the fasteners to said chord members.

7. A truss-type joist comprising a pair of elongated, parallel spaced apart wood chord members which are interconnected together by metal webs formed in a Chevron or V-shape configuration and having fastener means associated therewith to secure opposing pairs of said metal webs to opposing sides of said chord members, end portions of said wood chord members extending outwardly beyond said metal webs at opposing ends of said joist, and a fabricated wooden structural beam insert located between and interconnecting said outwardly extending end portions of said wood chord members at each of the opposing ends of the joist whereby to enable the ends of the joist to be cut and shaped at a job site to desired dimensions.

8. The joist of claim 7 wherein said wooden structural beam insert is of an I-beam configuration having top and bottom parallel chords interconnected by a further web, each chord of the insert being juxtaposed to a respective one of said outwardly extending end portions of said wood chord members.

9. The joist of claim 8 wherein said chords and further web of said insert are provided with interengaging tongue and groove joints fixed together with adhesive to provide a predetermined structural strength.

10. The joist of claim 9 further including toothed metal connector plates at proximal end portions of said insert to secure the top and bottom chords of the insert to the outwardly extending end portions of said wood chord members.

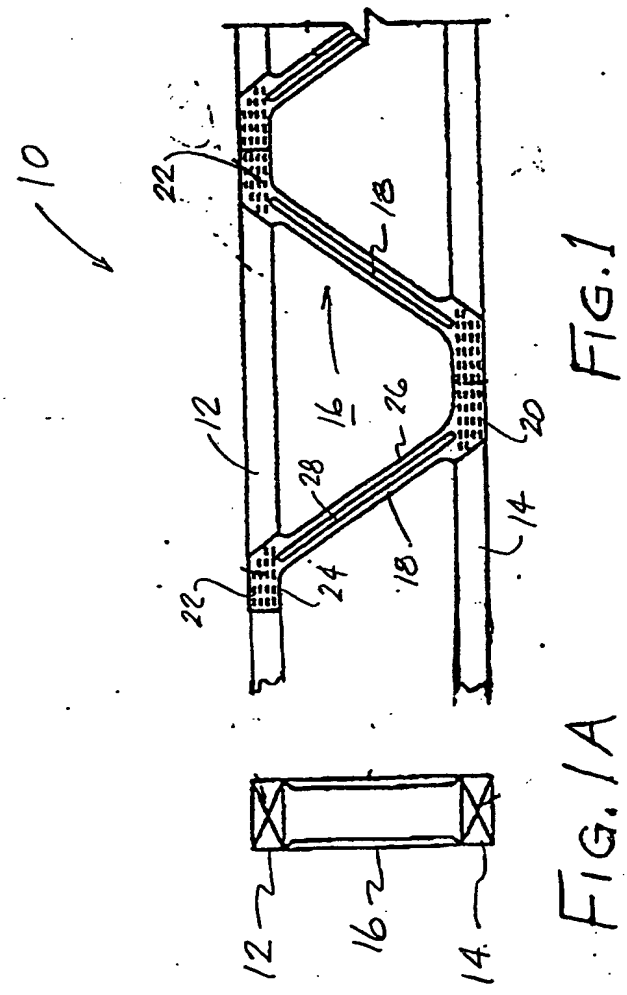
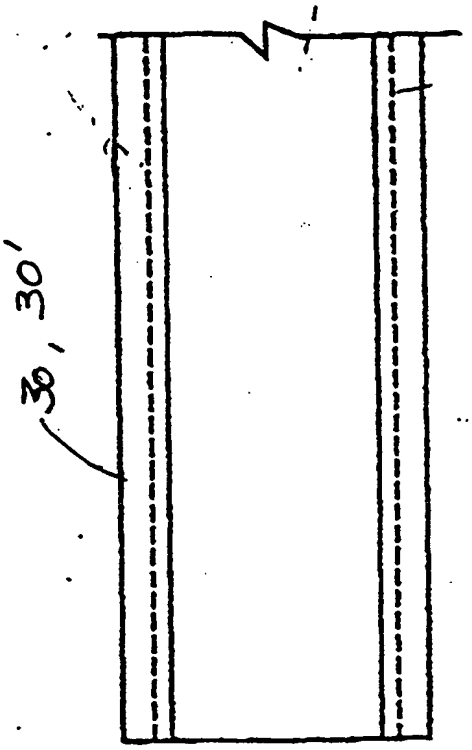


FIG. 1

FIG. 1A

FIG. 2



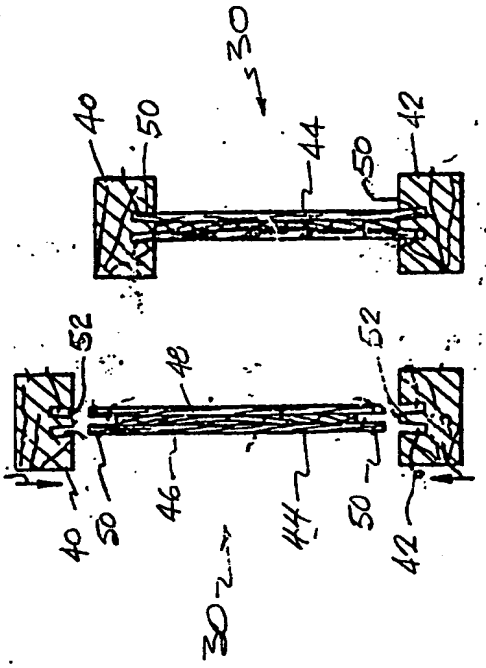


FIG. 2B

FIG. 2A

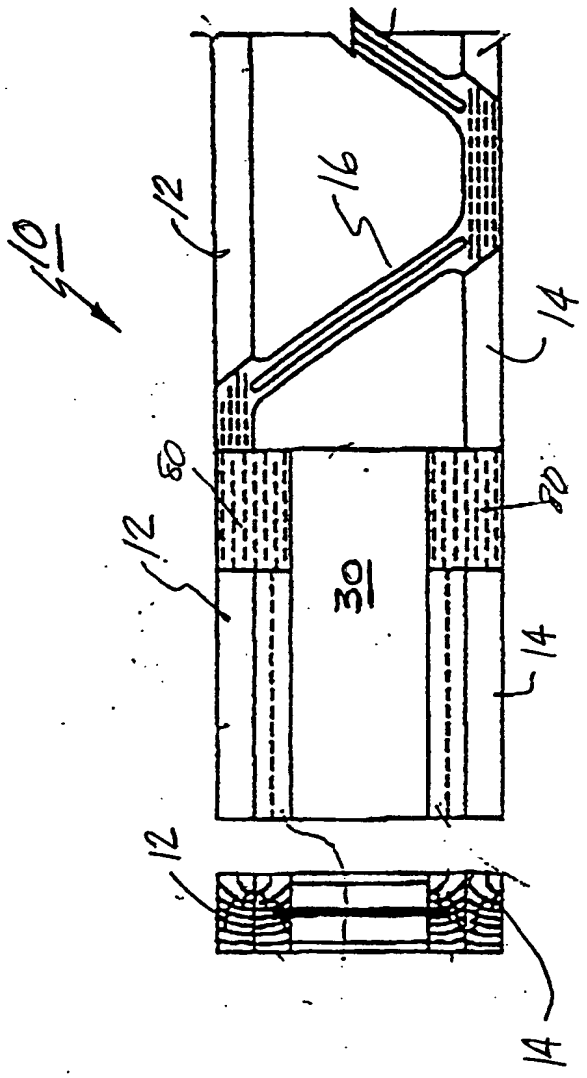


FIG. 3

FIG. 3A

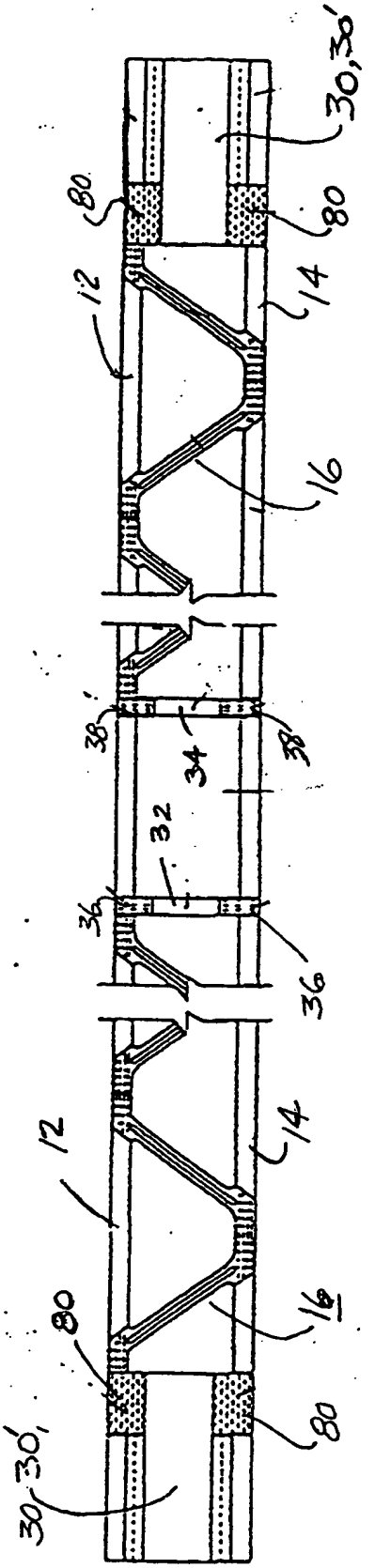


FIGURE 4: ELEVATION OF VARIOUS END SPECIES OF WOOD TRUSSES.

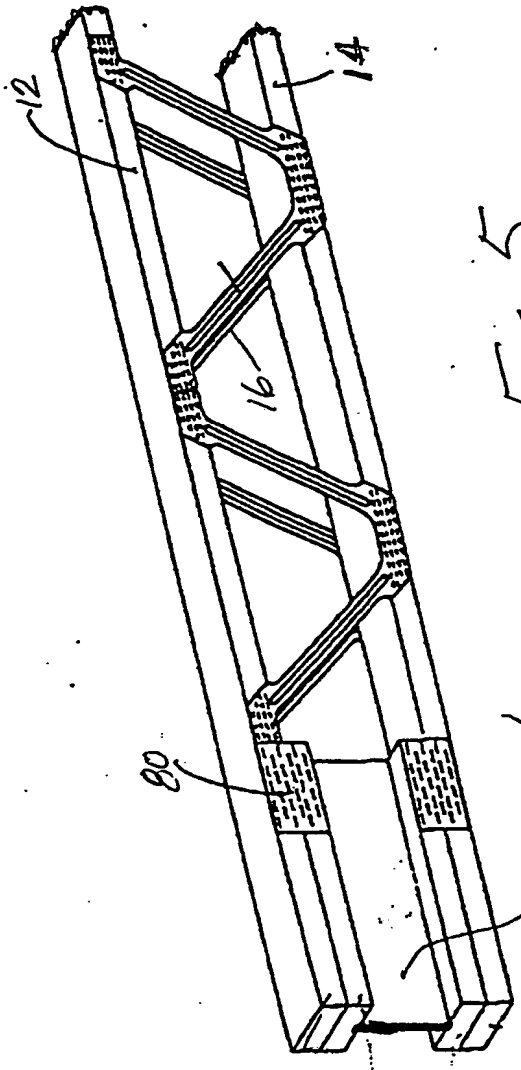


FIG 5

FIGURE 5: PERSPECTIVE VIEW OF VARIABLE END TRUSSES.

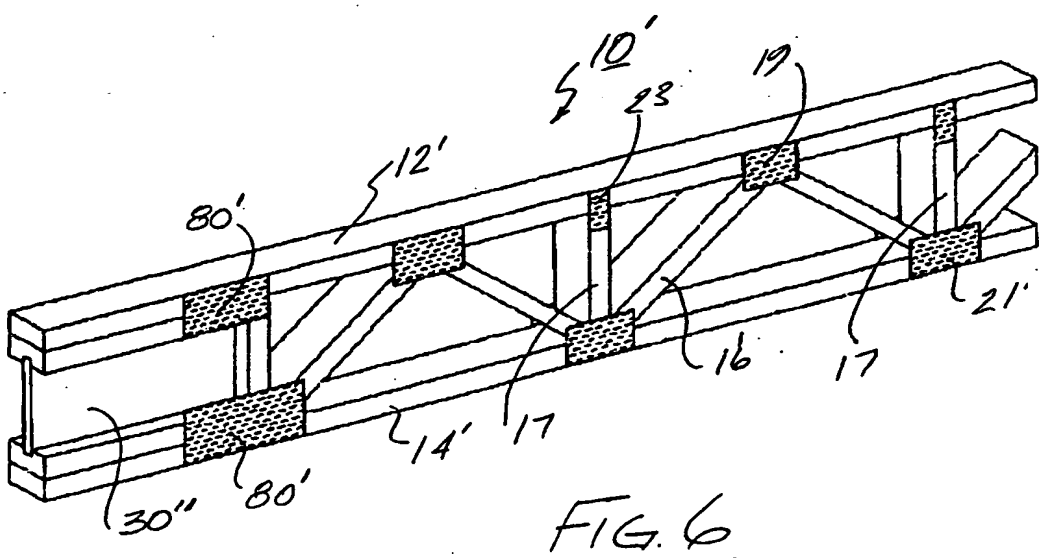


FIG. 6

PERSPECTIVE VIEW OF VARIABLE END WOOD WEB TRUSS